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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-------------------------------------|-------------|----------------------|---------------------|------------------|
| 10/604,212 | 07/01/2003 | Gregory G. Freeman | FIS920030098US1 | 1211 |
| 23550 | 7590 | 12/20/2004 | EXAMINER | |
| HOFFMAN WARNICK & D'ALESSANDRO, LLC | | | ECKERT II, GEORGE C | |
| 3 E-COMM SQUARE | | | ART UNIT | |
| ALBANY, NY 12207 | | | PAPER NUMBER | |
| | | | 2815 | |

DATE MAILED: 12/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

10/04

| | | | | |
|------------------------------|------------------------|--|---------------------|--|
| Office Action Summary | Application No. | | Applicant(s) | |
| | 10/604,212 | | FREEMAN ET AL. | |
| | Examiner | | Art Unit | |
| | George C. Eckert II | | 2815 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 02 December 2004.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 1-30 is/are pending in the application.

4a) Of the above claim(s) 15-30 is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 1-12 and 14 is/are rejected.

7) ☒ Claim(s) 13 is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of the group I invention (claims 1-14) in the reply filed on December 2, 2004 is acknowledged. The traversal is on the ground that a search of the subject matter of either of the two distinct groups would necessarily include subject matter of the other group and thus a serious burden has not been established. This is not found persuasive because, while an overlap may exist in the related classes and subclasses and thus the searches themselves may overlap, this does not equate to an overlapping examination. Searching is a part of examination but it is only one part. As made clear in the restriction requirement and explained in MPEP §808.02, a burden is established by showing a separate classification for each group. The requirement is still deemed proper and is therefore made FINAL. Claims 15-30 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on December 2, 2004.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Art Unit: 2815

2. Claims 1-4, 7-9, 11, 12 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by 5,798,561 to Sato. Sato teaches in figures 5-9 a self-aligned bipolar transistor comprising:

a raised extrinsic base including:

an outer region 34/36;

an inner extension region 38 extending laterally inward from the outer region toward an emitter 39, the inner extension region horizontally non-overlapping the outer region; and

an intrinsic base 37/35 positioned below the raised extrinsic base.

Regarding claim 2, Sato teaches that the outer region 34/36 is separated from the intrinsic base outer region (the outward lateral edge of region 35) by a dielectric layer 32. Regarding claims 3 and 4, Sato teaches that the inner extension region 38 defines an opening into which the emitter is self-aligned and that a spacer 14 is formed between the inner extension region and the emitter (see figs. 6J-L). Regarding claims 7-9 and 12, Sato teaches that both the inner region 38 and the outer region 36 contact the intrinsic base at separate locations (fig. 9 shows both 38 and 36 contacting 37) and that the outer base intrinsic region is over a shallow trench isolation 4 in that it is located in a higher plane. Regarding claim 11, Sato teaches that the outer region 34/36 is doped p⁺ (high concentration, col. 13, lines 23 and 39) while the inner region 38 is doped p (lower concentration, col. 13, line 45). Regarding claim 14, Sato teaches that the outer region includes polysilicon (col. 13, line 23) and the inner region also includes polysilicon (col. 13, line 45 and see col. 14, lines 11-12 indicating that SiGe is actually Ge doped Si)

3. Claims 1, 3, 4, 7-9 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by 5,962,880 to Oda et al. Oda teaches in figure 1 a self aligned BJT comprising:

a raised extrinsic base including:

an outer region 12;

an inner extension region 11 extending laterally inward from the outer region toward an emitter 14/15, the inner extension region horizontally non-overlapping the outer region; and

an intrinsic base 9 positioned below the raised extrinsic base.

Regarding claim 3, Oda teaches that the inner extension region 11 defines an opening into which the emitter is self-aligned (note figure 8B showing the emitter 14/15 formed in the layer 11 such that 11 and 14 are aligned). Regarding claim 4, Oda teaches that a spacer 13 is formed between the inner extension 11 and the emitter 14. Regarding claims 7-9, Oda teaches that the inner and outer regions 11 and 10 both contact the intrinsic base 9, that the inner and outer locations are separated by region 12 such that they contact the intrinsic base at separate locations and that the outer region contacts an intrinsic base outer region that is positioned over (at a higher plane) a shallow trench isolation region 4. Regarding claim 11, Oda teaches that the inner and outer regions are doped differently (10 is p-type and 12 is low concentration p-type, col. 8, lines 4-10).

4. Claims 1, 2, 6 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by 6,603,188 to Darwish et al. Darwish teaches, with reference to figure 2, a BJT comprising:

a raised extrinsic base including:

an outer region 224;

an inner region 230 extending laterally inward from the outer region toward an emitter 232, the inner extension region horizontally non-overlapping the outer region; and

an intrinsic base 216 positioned below the raised extrinsic base.

Regarding claim 2, Darwish teaches that the outer region is separated from an intrinsic base outer region by dielectric 222. Regarding claim 6, Darwish teaches that the inner extension region 230 is formed on only one side of the emitter and thus has a non-uniform width.

Regarding claim 10, Darwish teaches that only the inner extension region contacts the intrinsic base. Alternatively, Darwish teaches in figure 3I a method of making the BJT wherein an inner extension region 372 is formed having a tapered top such that its width is non-uniform.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over '561 to Sato. Sato taught the device of claim 1 as discussed above but did not expressly teach that the emitter width was less than 0.1 microns. Sato did teach that the purpose of the invention is to reduce the contact area between the intrinsic base and collector (see fig. 5, the distances S1 and S2 and see col. 7, lines 26-30). Because the emitter is only a fraction of the intrinsic base width, it is considered obvious to form the emitter having a width of 0.1 microns. The motivation for doing so is taught by Sato in that a smaller intrinsic base to collector contact area results in a faster device (col. 3, lines 7-13). Moreover, it is well known in the art that making a region smaller, here the emitter region smaller, allows for a smaller overall device and thus more devices may be

Art Unit: 2815

incorporated into a single circuit which increases density. It is considered obvious to form the device of Sato having an emitter width of 0.1 microns.

Allowable Subject Matter

6. Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art did not teach or suggest, either alone or in combination, a device wherein the inner extension region is doped higher than the outer region, as instantly claimed and in combination with the remaining claim elements.


Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional art teaches various structures of raised extrinsic base BJTs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George C. Eckert II whose telephone number is (571) 272-1728.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax number is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


GEORGE ECKERT
PRIMARY EXAMINER